UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/077,029 | 05/18/1998 | MUTSUMI KIMURA | JAO40499 | 5555 |

25944 7590 12/05/2008

OLIFF & BERRIDGE, PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

| EXAMINER | |
|---|---|
| LIN, JAMES | |
| ART UNIT | PAPER NUMBER |
| 1792 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 12/05/2008 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/077,029 | KIMURA ET AL. | |
| | Examiner | Art Unit | |
| | Jimmy Lin | 1792 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *19 September 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *101-105,107-112 and 123-130* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *101-105,107-112 and 123-130* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/23/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/19/2008 has been entered.

### *Claim Interpretations*

2. The term "surround" has been given its ordinary meaning, which is to form an enclosure round or to encircle.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 101-104 are rejected under 35 U.S.C. 103(a) as being obvious over Roitman (U.S. Patent 5,972,419) in view of Ra et al. (U.S. Patent No. 5,874,200).

Roitman discloses a method of making an EL device (abstract). Pixel electrode 132 is formed on a substrate and a solid insulating layer 131 is formed on the electrode. EL material is deposited in the wells formed between the insulating layers (col. 3, lines 29-50). The insulating layer can be left in place (col. 4, lines 1-2). The purpose of the insulating layer is to confine the droplets of EL material, preventing them from mixing.

Roitman does not explicitly teach enhancing a liquid repellency at a surface of the insulating layer. However, Roitman does teach in a first embodiment that insulation layers can be formed on the substrate to confine the droplets, and in a second embodiment that hydrophilic and hydrophobic regions can be formed on the substrate in order to confine the droplets. Using

both embodiments together would have further ensured the confinement of the droplets and, thus, would have been an obvious modification. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used insulating layers while at the same time forming hydrophilic and hydrophobic regions on the substrate of Roitman with a reasonable expectation of success. One would have been motivated to do so in order to have further ensured the confinement of the droplets. In light of these teachings, one of ordinary skill in the art would have made the first electrode more wettable towards the liquid droplets while making the insulating layers more repellent.

Roitman does not explicitly teach that enhancing a liquid repellency at the surface of the insulating layer is performed by one of an ultraviolet (UV) irradiation and an irradiation of plasma. Roitman does teach that the insulating layer 131 can be a conventional photoresist material. Accordingly, Ra teaches a method of reducing the hydrophobicity of a photoresist such that the photoresist comes to have more hydrophilicity. The method comprises of exposing the photoresist to UV irradiation (col. 3, line 57-col. 4, line 17). Roitman exemplifies xylene as a suitable solvent (col. 3, lines 1-10). Xylene is a hydrophobic liquid and would be at least somewhat repellent to a hydrophilic surface. Because the combination of using insulating layers as well as forming hydrophobic and hydrophilic regions would have been obvious over the teachings of Roitman, it would have been obvious to one of ordinary skill in the art at the time of invention to have exposed the insulating layers of Roitman to UV irradiation in order to have made the insulating layers more hydrophilic towards xylene with a reasonable expectation of success. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945).

Roitman does not explicitly teach the order of patterning the insulating layer and enhancing the liquid repellency of the insulating layer. However, one of ordinary skill in the art would have expected similar results in performing the patterning of the insulating before or after enhancing the liquid repellency because either method would have enhanced the upper surface of the insulating layer. The selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. See, for instance, *In re Burhans,* 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Therefore, it would have been obvious to one of ordinary skill

in the art at the time of invention to have performed the patterning step *after* the enhancing step, as opposed to performing the patterning step *prior to* the enhancing step, with a reasonable expectation of success because one of ordinary skill would not have anticipated any new or unexpected results and, thus, would have done so with predictable results.

Roitman does not explicitly teach that the repellency of the side-wall of the insulating layer is lower than the liquid repellency of the upper surface of the insulating layer. However, this phenomenon occurs when the UV liquid repellency enhancement step of Ra is performed before the patterning step. Because only the top surface of the insulating layer is exposed to the UV irradiation when irradiation occurs prior to patterning, the repellency of the side-walls of the insulating layer has not been enhanced. Thus, performing the UV irradiation prior to patterning would necessarily form side-walls having less repellency than the upper surfaces.

5. Claims 101-104 and 129-130 are rejected under 35 U.S.C. 103(a) as being obvious over Roitman (U.S. Patent 5,972,419) in view of Tsuchiya et al. (U.S. Patent No. 5,536,603).

Roitman is discussed above, but does not explicitly teach that enhancing a liquid repellency at the surface of the insulating layer is performed by an irradiation of plasma including fluorine. Roitman does teach that the insulating layer 131 can be a conventional photoresist material. Accordingly, Tsuchiya teaches that it was well known to have exposed a photoresist to a fluorine plasma in order to enhance the repellency (col. 7, lines 49-57; Figs. 9A-9C). Because the combination of using insulating layers as well as forming hydrophobic and hydrophilic regions (i.e., attracting and repelling regions) would have been obvious over the teachings of Roitman, it would have been obvious to one of ordinary skill in the art at the time of invention to have exposed the insulating layers of Roitman to fluorine plasma in order to have made the insulating layers repellent to the droplets of EL material with a reasonable expectation of success.

6. Claims 105, 107-111, and 126-127 are rejected under 35 U.S.C. 103(a) as being obvious over Roitman '419 in view of Kaneko (JP 07-153574, as provided by Applicant), Ohno et al. (U.S. Patent No. 5,705,302), and Yamazaki et al. (U.S. Patent No. 5,929,464).

Roitman is discussed above, but does not explicitly teach a plurality of first electrodes on predetermined positions and forming an insulating layer so as to surround the predetermined positions. However, Kaneko teaches that it was well known in the art of EL devices to have formed pixels 14 in rectangular shapes. Insulating layers 13 are used to form the pixels. In this configuration, the insulating layers surround a plurality of electrodes 12 (Figs. 1, 3, and 5-8). Because Roitman teaches that insulating layers are used to define pixels and because Kaneko teaches that such insulating layer configurations were operable in the EL art, it would have been obvious to one of ordinary skill in the art at the time of invention to have formed an insulating layer so as to surround a plurality of electrodes to define rectangular pixels in the EL device of Roitman with a reasonable expectation of success.

Roitman does not explicitly teach a difference of wettability between the first electrode and the insulating layer. However, Roitman teaches in a first embodiment that insulation layers can be formed on the substrate to confine the droplets, and teaches in a second embodiment that hydrophilic and hydrophobic regions can be formed on the substrate in order to confine the droplets. Using both embodiments together would have further ensured the confinement of the droplets and, thus, would have been an obvious modification. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used insulating layers while at the same time forming hydrophilic and hydrophobic regions on the substrate of Roitman with a reasonable expectation of success. One would have been motivated to do so in order to have further ensured the confinement of the droplets. In light of these teachings, one of ordinary skill in the art would have made the first electrode more wettable towards the liquid droplets while making the insulating layers more repellent.

Roitman does not explicitly teach that the wettability of the first electrode is enhanced. However, Ohno teaches that conductive layers such as those made of indium tin oxide (ITO) can be made hydrophobic with treatments such as RF plasma and UV light irradiation (col. 9, lines 13-25). The enhanced hydrophobicity of the ITO film would be more wettable towards the hydrophobic xylene solvent of Roitman. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have enhanced the hydrophobicity of the first electrode of Roitman (Roitman exemplifies ITO as a suitable first electrode material, see col. 2, lines 40-42) with a reasonable expectation of success because Roitman made the suggestion of

having hydrophobic and hydrophilic regions in order to confine the droplets and because Ohno teaches that ITO films can be treated to enhance hydrophobicity. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945).

Roitman does not explicitly teach an active matrix type EL device and that the first electrodes are electrically coupled to a corresponding transistor. However, Yamazaki teaches that an active matrix display unit is capable of performing a distinct display of a larger capacitance than that of a simple matrix display unit (col. 1, lines 16-22). A plurality of transistors connected in series can be attached to one pixel electrode (abstract). It would have been obvious to one of ordinary skill in the art at the time of invention to have provided the EL display of Roitman as an active matrix type device with a reasonable expectation of success. One would have been motivated to do so in order to have provided a distinct display of a larger capacitance. Additionally, it would have been obvious to one of ordinary skill in the art at the time of invention to have connected transistors of the active matrix system to the corresponding first electrodes of Roitman with a reasonable expectation of success because Yamazaki teaches that such configurations were operable for an active matrix display.

Claim 107: Kaneko teaches that the insulating layer covers at least part of the first electrodes (Fig. 3).

Claim 108: Roitman does not explicitly teach that forming an interlayer film on the insulating layer, wherein the interlayer film is repellent to the liquid solution compared to the first electrode. However, any method of making the region of the insulating layer to be hydrophilic would have been operable. Forming a hydrophilic film onto the insulating layer would have been an operable method and would have been well within the knowledge of one of ordinary skill. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have formed a hydrophilic film onto the insulating layer of Roitman in light of the teachings of Roitman with a reasonable expectation of success. One would have been motivated to do so to have made a hydrophilic region.

Claim 109: Roitman teaches that the liquid solution is deposited by an ink jet method.

Claim 111: In light of the teachings of Roitman, one of ordinary skill in the art would have made the insulating layer hydrophilic while enhancing the hydrophobicity of the first

electrode according to the method of Ohno. Thus, the insulating layer would be more repellent to the liquid solution compared to the electrode.

Claims 126-127: Kaneko teaches that a second electrode 16 can be formed over the insulating layer and the optical material.

7. Claim 112 is rejected under 35 U.S.C. 103(a) as being obvious over Roitman '419 in view of Kaneko '574, Ohno '302, and Yamazaki '464 as discussed above for claim 110, and further in view of Ra '200.

Roitman is discussed above, but does not explicitly teach that the repellency of the side-wall of the insulating layer is lower than that of the upper surface of the insulating layer. However, such is obvious for substantially the same reasons as discussed in claim 101.

8. Claim 112 is rejected under 35 U.S.C. 103(a) as being obvious over Roitman '419 in view of Kaneko '574, Ohno '302, and Yamazaki '464 as discussed above for claim 110, and further in view of Tsuchiya '603 for substantially the same reasons as discussed immediately above.

9. Claims 123 and 128 are rejected under 35 U.S.C. 103(a) as being obvious over Roitman '419 in view of Kaneko '574 and Ra '200 as discussed above for claim 101, and further in view of Yamazaki '464.

Roitman does not explicitly teach an active matrix type EL device and that the first electrodes are electrically coupled to a corresponding transistor. However, Yamazaki teaches that an active matrix display unit is capable of performing a distinct display of a larger capacitance than that of a simple matrix display unit (col. 1, lines 16-22). A plurality of transistors connected in series can be attached to one pixel electrode (abstract). It would have been obvious to one of ordinary skill in the art at the time of invention to have provided the EL display of Roitman as an active matrix type device with a reasonable expectation of success. One would have been motivated to do so in order to have provided a distinct display of a larger capacitance. Additionally, it would have been obvious to one of ordinary skill in the art at the time of invention to have connected transistors of the active matrix system to the corresponding

first electrodes of Roitman with a reasonable expectation of success because Yamazaki teaches that such configurations were operable for an active matrix display.

Claim 128: Kaneko teaches that a second electrode 16 can be formed over the insulating layer and the optical material.

10. Claims 123 and 128 are rejected under 35 U.S.C. 103(a) as being obvious over Roitman '419 in view of Kaneko '574 and Tsuchiya '603 as discussed above for claim 101, and further in view of Yamazaki '464 for substantially the same reasons as discussed immediately above.

11. Claims 124-125 are rejected under 35 U.S.C. 103(a) as being obvious over Roitman '419 in view of Ra '200 as discussed above for claims 101 and 103, and further in view of Kaneko '574.

Roitman teaches forming a second electrode, but does not explicitly teach that forming a second electrode over the solid insulating layer and the optical material. However, Kaneko teaches that it was well known to have formed a second electrode 16 over both the solid insulating layer 13 and the optical material 15 (Figs. 1 and 7-8). Because Kaneko teaches that such EL structures were operable, it would have been obvious to one of ordinary skill in the art at the time of invention to have formed the second electrode of Roitman over the insulating layer and optical material with a reasonable expectation of success.

12. Claims 124-125 are rejected under 35 U.S.C. 103(a) as being obvious over Roitman '419 in view of Tsuchiya '603 as discussed above for claims 101 and 103, and further in view of Kaneko '574 for substantially the same reasons as discussed immediately above.

***Response to Arguments***

13. Applicant's arguments filed 10/30/2007 have been fully considered but they are not persuasive.

Roitman in view of Ra:

Applicant argues on pg. 8 that Roitman discloses the use of hydrophilic and hydrophobic regions as an alternative to the use of mask 131 and that one of ordinary skill in the art, taking

the applied references as a whole, would have no reason to modify the mask 131 to be hydrophobic because this would provide no additional benefit over mask 131, while adding the detriments of extra cost, extra manufacturing steps, extra time of manufacture, and extra complexity. However, Roitman teaches the need to isolate the deposited EL material and that the isolation can be performed using two alternative methods. One of ordinary skill in the art would have recognized that the use of both methods together would have been operable and that it would have had the benefit of increased isolation. Although the modification may have some set backs, there was sufficient motivation and predictability to make such modifications.

Applicant argues on pg. 9 that the method of Ra reduces hydrophobicity of the resist pattern 114 and that reducing the hydrophobicity is reducing the liquid repellency. However, hydrophobicity and hydrophilicity as applied in terms of liquid repellency is relative to the liquid. For example, xylene (i.e., an exemplified carrier liquid of Roitman) is a hydrophobic liquid. Xylene would be attracted to hydrophobic surfaces and repelled against hydrophilic surfaces. Thus, reducing the hydrophobicity of xylene would enhance the surface repellency towards xylene.

Applicant argues on pg. 9 that the applied references fail to disclose "a method of manufacturing an active matrix type electro-luminescent device" (emphasis added). However, Yamazaki teaches that it was well known to have provided an active matrix to an EL device. The teachings of Yamazaki have been incorporated into the rejection to account for the claim amendments.

Roitman in view of Kaneko and Ohno:

Applicant argues on pg. 10 that Roitman discloses the use of hydrophilic and hydrophobic regions as an alternative to the use of mask 131 and that one of ordinary skill in the art, taking the applied references as a whole, would have no reason to modify the mask 131 to be hydrophobic because this would provide no additional benefit over mask 131, while adding the detriments of extra cost, extra manufacturing steps, extra time of manufacture, and extra complexity. However, the argument is not persuasive for the same reasons as discussed above.

Applicant argues on pg. 11 that the applied references fail to disclose "a method of manufacturing an active matrix type electro-luminescent device" (emphasis added). However,

Yamazaki teaches that it was well known to have provided an active matrix to an EL device. The teachings of Yamazaki have been incorporated into the rejection to account for the claim amendments.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jimmy Lin whose telephone number is (571)272-8902. The examiner can normally be reached on Monday thru Friday 8AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jimmy Lin/
Examiner, Art Unit 1792

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792